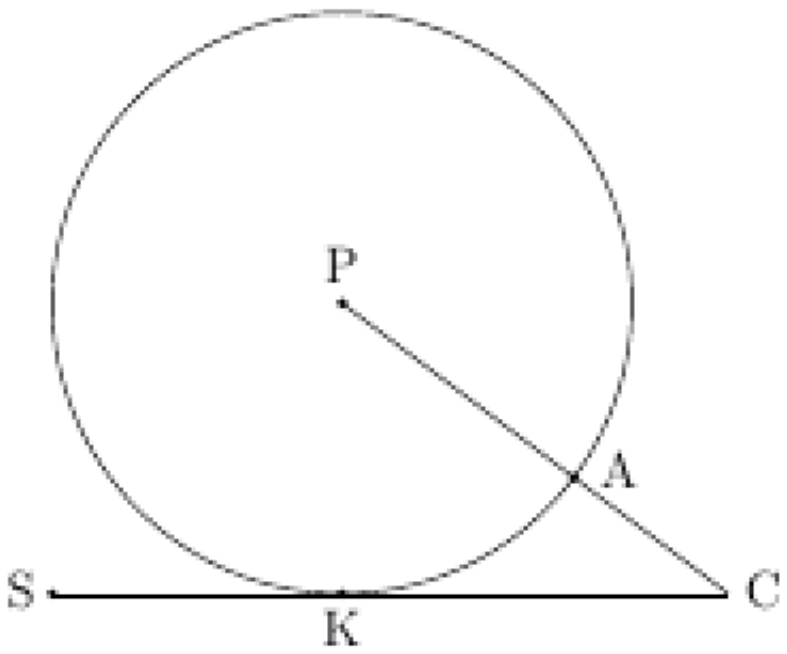
Topic: Tangent lines of circles

Question: Find the length of the line segment.

In circle P the radius is 6 cm and $\overline{CS}$ is tangent to the circle at K. If $AC = 4$, how long is CK?



Answer choices:

A 5 cm

B 6 cm

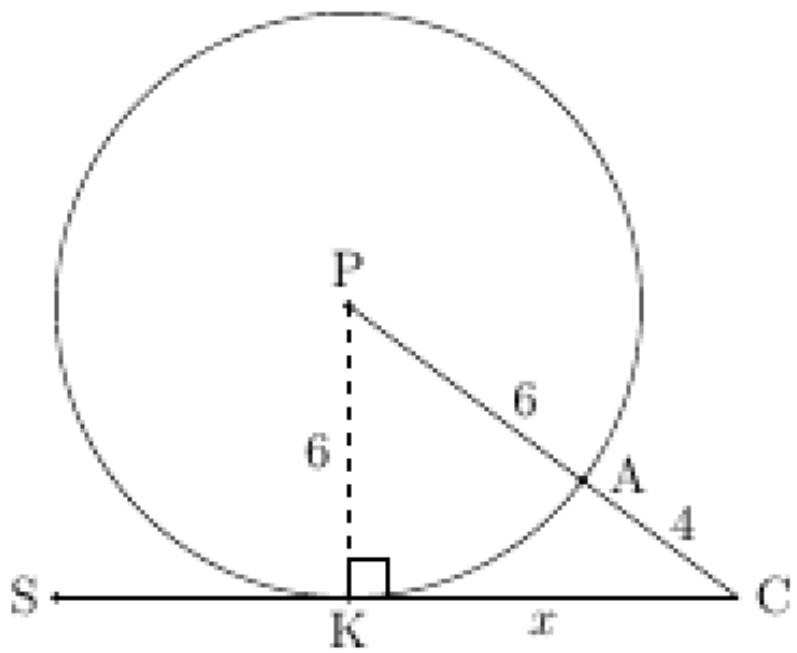
C 7 cm

D 8 cm

© Krista King Math

Solution: D

A radius drawn to K will be perpendicular to $\overline{CK}$, making a right triangle. Label the segments as shown in the figure.



Let $CK = x$ and use the Pythagorean Theorem.

$$x^2 + 6^2 = 10^2$$

$$x^2 + 36 = 100$$

$$x^2 = 64$$

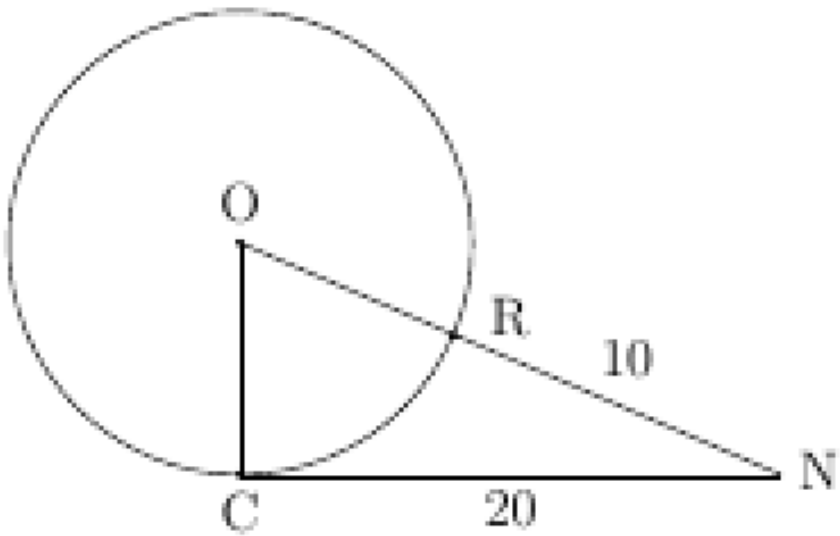
$$x = \sqrt{64} = 8 \text{ cm}$$

© Krista King Math

Topic: Tangent lines of circles

Question: Find the length of the radius.

In circle O, $\overline{CN}$ is tangent to the circle at C. If $CN = 20$ and $RN = 10$, what is the radius of the circle?



Answer choices:

A 15

B 12

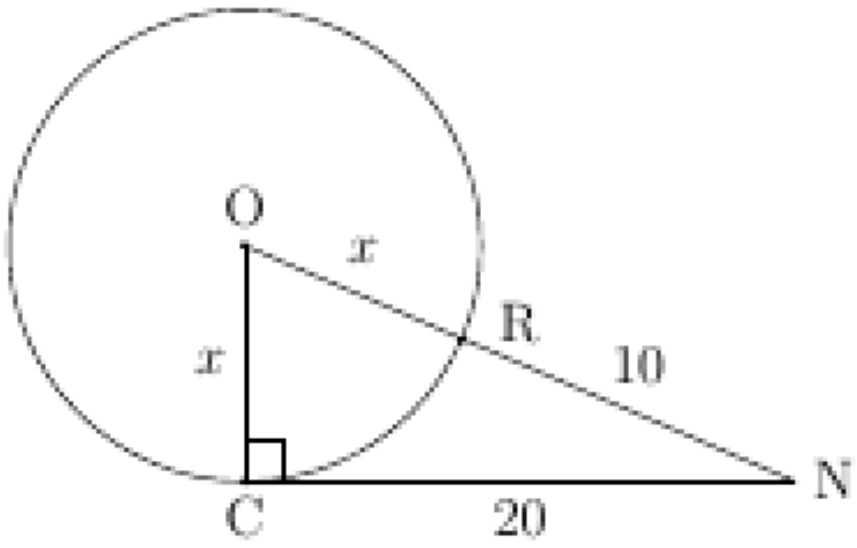
C 9

D 6

© Krista King Math

Solution: A

A radius drawn to C will be perpendicular to $\overline{CN}$, forming a right triangle.



Let $OC = x$ and $OR = x$ and use the Pythagorean Theorem.

$$x^2 + 20^2 = (x + 10)^2$$

$$x^2 + 400 = x^2 + 20x + 100$$

Subtract x^2 and 100 from each side, and rearrange.

$$20x = 300$$

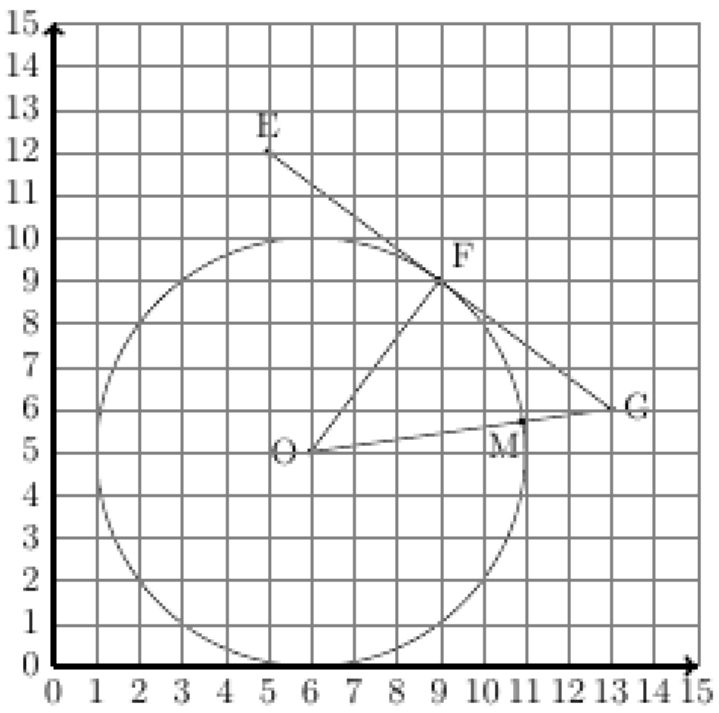
$$x = 15$$

© Krista King Math

Topic: Tangent lines of circles

Question: Find the length of the line segment.

In circle O, the center is at $(6,5)$, F is at $(9,9)$, and G is at $(13,6)$. $\overline{EG}$ is tangent to the circle at F. How long is GM?



Answer choices:

A $5\sqrt{2}$

B $5\sqrt{2}+5$

C $2\sqrt{5}$

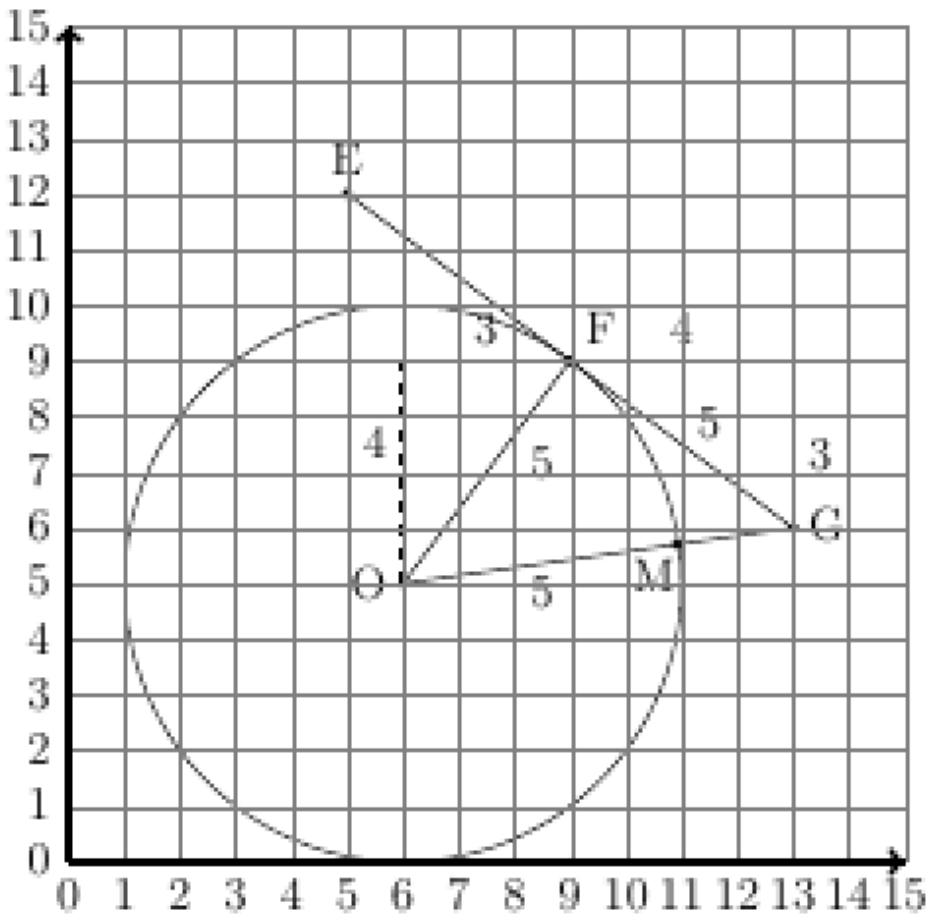
D $5\sqrt{2}-5$

© Krista King Math

Solution: D

Notice that $\overline{OF}$ is the hypotenuse of a right triangle whose sides are 3 and 4. That makes the radius $OF = 5$ and also radius $OM = 5$.

Also notice that FG is the hypotenuse of a second right triangle whose sides are 3 and 4. That makes $FG = 5$ also.



Now focus on ΔFOG. $\overline{OF} \perp \overline{FG}$ (OF is perpendicular to FG), making ΔFOG a 45-45-90 triangle. The pattern for this kind of triangle is x, x, and $x\sqrt{2}$.

That makes the hypotenuse $OG = 5\sqrt{2}$. OG is also $5 + MG$. So

$$5 + MG = 5\sqrt{2}$$

$$MG = 5\sqrt{2} - 5$$

© Krista King Math